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TITLE: CATHETER SHAFT WITH AN OBLONG TRANSVERSE  
CROSS-SECTION

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BSTX:

[0006] Some over-the-wire and rapid exchange type dilatation catheters have perfusion capabilities where one or more perfusion ports are provided in the catheter shaft proximal to the dilatation balloon which are in fluid communication with a guidewire receiving inner lumen extending to the distal end of the catheter. Additionally, one or more perfusion ports are preferably provided in the catheter shaft, distal to the balloon which are also in fluid communication with the guidewire receiving inner lumen. When the balloon of a dilatation catheter with perfusion capabilities is inflated to dilate a stenosis, oxygenated blood in the artery or the aorta or both, depending upon the location of the proximal perfusion parts of the dilatation catheter within the coronary anatomy, is forced to pass through the proximal perfusion ports, through the guidewire receiving inner lumen of the catheter and out the distal perfusion ports. The flow of oxygenated blood downstream from the inflated balloon minimizes ischemic conditions in tissue distal to the balloon and allows for long term dilatations, e.g. 30 minutes or even several hours or more. Commercially available perfusion type dilatation catheters include the STACK PERfusion (TM) and the ACS RX PERfusion (TM) dilatation catheters which are sold by ACS.

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through the inner lumen 62 and then out the distal perfusion ports 70 to provide oxygenated blood distal to the catheter 60 and thereby avoid the generation of ischemic conditions in downstream tissue. The transverse dimensions of the inner tubular member 62 within the secured section are preferably larger than in the embodiments previously discussed to allow for an increased flow of blood.

DETX:

[0049] The dilatation catheter 30 shown in FIGS. 6-10 may be modified by providing a plurality of perfusion ports in the catheter shaft as shown in FIGS. 11-15 distal to the proximal guidewire port 42. However, the guidewire port 42 is preferably spaced sufficiently far proximally from the portion of the secured distal section having the perfusion ports so that the guidewire 43 can be pulled proximally and remain within the inner lumen 40 of the inner tubular member 33 while the balloon is inflated during a long term dilatation but not interfere with the flow of blood through the perfusion ports. After the angioplasty procedure is completed, the guidewire 43 can then be advanced distally through the inner lumen 40 and out the distal end thereof in order to maintain access to the lesion in case further treatment or diagnosis is necessary or desirable.

CLTX:

10. The dilatation catheter of claim 9 wherein at least one perfusion port extends through the flexible distal shaft section proximal to the inflatable dilatation member and distal to the proximal guidewire port and is in fluid communication with the guidewire receiving inner lumen.

CLTX:

DETX:

[0046] FIGS. 11 through 15 illustrate yet another dilatation catheter 60 embodying features of the invention which provides for the perfusion of blood distal to the catheter during the dilatation of a stenotic lesion. The catheter 60 includes the catheter shaft 61, an inner tubular member 62 which has an inner lumen 63, an outer tubular member 64 disposed about the inner tubular member, an adapter 65 secured to the proximal ends of the inner and outer members, and a relatively inelastic balloon 66 which is secured by its distal end to the distal end of the inner tubular member 62. A portion of the outer tubular member 64 has a distal section 67 a length 68 of which is secured to the exterior of the inner tubular member 62 as previously described in the first two embodiments of the invention. The above-described portion of this embodiment has essentially the same structure as the embodiments shown in FIGS.

1-10.

DETX:

[0047] The dilatation catheter shown in FIGS. 11-15 differs from the other embodiments in that it has a plurality of perfusion ports 69 proximal to the balloon 66 which pass through the secured walls of the inner and outer tubular members 62 and 64 respectively and which are in fluid communication with the inner lumen 63 of the inner tubular member 62. Additionally, one or more perfusion ports 70 are provided distal to the balloon 66 through the wall of the inner tubular member 62 and are in fluid communication with the inner lumen 63 extending therein. In this manner, when the balloon 66 is inflated during an angioplasty procedure within a patient's vasculature, oxygenated blood is forced to pass through the proximal perfusion ports 69,

11. The dilatation catheter of claim 1 wherein at least one perfusion port is provided in the flexible distal shaft section distal to the inflatable dilatation member which is in fluid communication with the guidewire receiving inner lumen.

CLTX:

20. The dilatation catheter of claim 19 wherein at least one perfusion port extends through a wall of the flexible distal shaft section proximal to the inflatable dilatation member and distal to the proximal guidewire port where the outer tubular member takes the shape of and is secured to the inner tubular member and is in fluid communication with the guidewire receiving inner lumen.

CLTX:

56. The dilatation catheter of claim 53 wherein at least one perfusion port extends through the flexible distal shaft section proximal to the inflatable dilatation member and distal to the proximal guidewire port and is in fluid communication with the guidewire receiving inner lumen.

CLTX:

57. The dilatation catheter of claim 47 wherein at least one perfusion port is provided in the flexible distal shaft section distal to the inflatable dilatation member which is in fluid communication with the guidewire receiving inner lumen.